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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/444,034	11/19/1999	RAMAKRISHNA PATTIKONDA	1152-0009	8104

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EXAMINER

LAROSE, COLIN M

ART UNIT

PAPER NUMBER

2623

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6-

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/444,034

Applicant(s)

PATTIKONDA ET AL.

Examiner

Colin M. LaRose

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other:

DETAILED ACTION

Drawings

1. This application has been filed with informal drawings which are acceptable for examination purposes only. Formal drawings will be required when the application is allowed.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
4. Claims 1 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,298,977 by Shintani et al. ("Shintani") and Applicant's Admission of Well-Known Prior Art ("Admission").

Regarding claims 1 and 9, Shintani discloses an optical inspection system for inspecting at least one structure of an object, said system comprising:

a first visual light source (green light source 3, figure 1a) which illuminates the surface of the object and the structure with a light at a first visual frequency (i.e. green);

a first coherent light source (blue laser light source 5, figure 1a) which illuminates the surface of the object with a narrow coherent light beam (blue beam 6, figure 1a) simultaneously with illumination by the first visual light source, said coherent light beam being at a second visual frequency (i.e. blue) that is different from the first visual frequency of the visual light source, said first coherent light source being mounted off vertical which enables the coherent light beam to be directed over an area of interest (spots 10, 13, figures 1c, 1d) on the surface of the object;

a color scan camera (color TV camera 8, figure 1a) mounted vertically above the object, said camera having a first channel which captures an image of the illuminated surface of the object and the structure at the first visual frequency, and a second channel which captures a path of the coherent light beam as it strikes the surface of the object and the structure at the second visual frequency [While not expressly disclosed by Shintani, color cameras were commonly capable of capturing images at green and blue frequencies through first and second color channels. Official notice taken.]; and

a computer (element 17, figure 5a, or alternatively element 8, which computes a measure of the radiant energy of the object's surface, said measure containing information pertaining to the height of the structure) which determines height information for the structure from the path

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of the coherent light beam at the second visual frequency (column 4, line 66 through column 5, line 5: path of green beam is used for determining height information).

Shintani does not expressly disclose that the first coherent light source is on a movable mount. Shintani discloses that all three lights “can be automatically displaced by certain means so as to change the incident angles thereof... to carry out the circuit board visual inspection method with a high degree of accuracy.” Based on this teaching, one of ordinary skill in the art at the time the invention was made would have been motivated to use a movable mount in order to displace the paths of the beams.

Shintani is silent to determining 2-D structure information from the image at the first visual frequency. However, techniques for determining 2-D structure information for inspection purposes were well-known in the art at the time of the invention, and the motivations for determining 2-D information of structures for the purposes of inspection (e.g. determining length and width for dimensional tolerance analysis) were obvious to those of skill in the art. Applicant discloses that determining 2-D information using a light source was well-known and omits details of the conventional techniques used for determining 2-D information (Specification page 2, line 20 through page 3, line 2, and page 10, lines 7-10). In view of Applicant’s Admission, it would have been obvious to determine 2-D structure information from an image of the structure at the first visible frequency.

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Regarding claims 2 and 10, Shintani discloses a second visual light source (red light source 1, figure 1a) mounted on an opposite side of the object from the first visual light source, said second visual light source illuminating the surface of the object and the structure with a third visual frequency (i.e. red).

Regarding claims 3 and 11, Shintani does not expressly disclose the color scan camera includes a third channel which captures an image of the illuminated surface of the object and the structure at the third visual frequency, however, at the time the invention was made, 3-channel color cameras that capture reflected visible light in red, green, and blue channels were widely used by those of skill in the art. Official notice taken.

Regarding claim 4 and 12, Shintani does not expressly disclose the computer also determining 2-D structure information from the image at the third visual frequency, however, on page 10, lines 7-10 of the Specification, Applicant discloses that determining 2-D structure information from two visual light sources was common in the art. As stated above, motivation to determine 2-D structure information for inspection purposes was obvious to those of skill in the art the time the invention was made.

Regarding claims 5 and 13, Shintani does not disclose the color scan camera includes means for making a continuous series of exposures as the camera scans the surface of the object, however, this is an inherent feature of color TV cameras, which create a series of exposures at 60 frames per second.

5. Claims 6 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and U.S. Patent 4,253,113 by Decavel et al. ("Decavel").

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Regarding claims 6 and 14, Shintani is silent to varying the length of each exposure of the color camera.

Decavel discloses an inspection system that utilizes a TV camera capable of different exposure lengths (column 2, lines 28-36).

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace Shintani's camera with Decavel's adjustable exposure camera since, at the time the invention was made, varying exposure lengths was a well-known imaging technique for controlling the quality of images.

6. Claims 7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and Decavel in view of U.S. Patent 5,055,677 by Sayag.

Regarding claims 7 and 15, Although Shintani and Decavel are silent to the computer including means for integrating the height information over the length of an exposure to calculate average height, this limitation is a common feature of imaging devices that were known at the time the invention was made.

Sayag provides a general background of the functionality of semiconductor imaging devices, such as CCDs. Sayag teaches that CCDs capture images, inter alia, by accumulating charges during an integration (exposure) period, and the amount of charge accumulated provides a measure of the average radiant energy (column 1, lines 37-40). Therefore, information pertaining to height (e.g. light spots 11,12,13 in figure 1d of Shintani) are average values due to the integration performed by the CCD. Thus height H is also an average value for the length of an exposure period since H is derived from the averaged light spots 11,12,13.

7. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintani, Admission, and U.S. Patent 3,187,185 by Milnes.

Regarding claims 8 and 16, Shintani discloses a second coherent light source (red laser source 2, figure 1a) mounted on a side of the object which is displaced ϕ degrees from the first coherent light source, said second laser light source illuminating the surface of the object in a path that is offset by ϕ degrees from the path illuminated by the first coherent light source.

Shintani is silent to the light sources being displaced by 90 degrees and the light sources illuminating in perpendicular paths as exemplified in figure 1 of the present invention.

Milnes discloses a similar inspection system for determining the dimensions of a structure. In particular, figure 5 shows light beam sources 18 and 24 directed towards a surface, wherein the beams are perpendicular with respect to each other. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Shintani by Milnes to displace the mounted light sources by 90 degrees and illuminate the object with perpendicular beam paths since Milnes shows that aligning the beams at a 90 degree angle achieves substantially the same results as aligning the beams at other angles in that the dimensions of the object can be accurately determined.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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U.S. Patent 5,414,268 by McGee and U.S. Patent 4,803,371 by Durland are inspection systems that utilize coherent and non-coherent light to determine an object's dimensions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489. The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9314.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

CML

Group Art Unit 2623

18 September 2002

JOSEPH MANCUSO
PRIMARY EXAMINER